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AUTHOR Clark, W. J.
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ABSTRACT

Many parents on a southwestern Manitoba (Canada) Indian reservation are troubled by the small number of high school students who graduate. Much of the failure can be attributed to the generally poor writing skills of aboriginal students. To increase the students' writing ability, a computer-assisted instruction program emphasizing writing and thinking was implemented for students in grades 7-9. The purpose of this study was to investigate whether students receiving computer-assisted writing instruction would outperform students receiving traditional writing instruction (using pencil and paper) on the language arts component of a standardized diagnostic test. Following a quasi-experimental design, the researcher applied both a pretest and a posttest to the experimental and control groups. Prior to the introduction of the "KnowledgeBuilder" writing program and again at the end of the school year, the students in grades 7-9 of two southern Manitoba Indian reserves were administered the Canadian Test of Basic Skills, and the mean scores for each grade of the two schools were compared. While the findings of this study showed no significant difference between the groups, the experimental school's teachers felt there was an overall improvement in the quality of expository writings. Thirteen tables present results of the study and descriptions and comparisons of the control and experimental groups. (Author/AEF)

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Effect of A Computer Assisted Instruction Program on Aboriginal Student Achievement

Submitted
in
Partial Fulfillment
of
07:600 Master's Project

Dr. Y.L.J. Lam

W.J. (Jim) Clark
891949

4 April 1996

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Acknowledgments

The idea from this project grew out of twenty years of teaching, observing, and listening to parents and teachers. To all those colleagues and parents, I give thanks.

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Abstract

Many parents of a southwestern Manitoba Indian reserve are troubled by the small number of high school students who graduate. Much of the failure can be attributed to the poor writing skills of aboriginal students. As a means to increase the student's writing ability, a computer-assisted instruction program emphasizing writing and thinking was implemented for students in grades 7-9.

The purpose of this study was to investigate whether students receiving computer-assisted writing instruction would outperform students receiving traditional writing instruction using pencil and paper on the language arts component of a standardized diagnostic test.

Following a quasi-experimental design, the researcher applied both a pretest and a posttest to the experimental and control groups. Prior to the introduction of the KnowledgeBuilder™ writing program and again at the end of the school year, the grade 7-9 students of two southern Manitoba Indian reserves were administered the Canadian Test of Basic Skills, and the mean scores for each grade of the two schools were compared. While the findings of this study showed no significant difference between the groups, the experimental school's teachers felt there was an overall improvement in the quality of expository writings.

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Effect of A Computer Assisted Instruction Program on Aboriginal Student Achievement

CHAPTER 1

1.0 INTRODUCTION

"Reflective writing does not just happen.
It must be well-planned and nurtured in
a supportive, yet structured environment."

Otto Toews & Joan McCreath

1.1 Background

The experimental school is operated by a southwestern Manitoba band, with an enrollment of two hundred and eighty (280) students N-9, located thirty minutes from an urban center with a paved highway connecting the communities. English is the primary home and academic language. The school is staffed by 16.5 teachers and 3 teaching assistants. The principal is a full-time administrator.

Each class has a wide range of academic ability, from high average to at-risk students. The Manitoba curriculum is followed and all the teachers are provincially certified at a salary grant rating of Level Four

or higher. In addition, there is a low teacher turnover rate.

Schools today are responsible for not only the academic subjects, but also for social issues and life skills, as well. The time allocations for the provision of these subjects has cut into the class time previously allocated to the teaching of mainly mathematics, science, language arts, and social studies. Valuable time for remediation and driil has been re-allocated. More special needs students are being mainstreamed and requires a certain amount of the teacher's attention and time. Budget restraints and cutbacks have prompted some school systems to cutback on staff, creating larger and in some cases, multigrade classrooms. These factors combined, make teaching the goals of the curriculum a very difficult challenge. Watson (1990) expands on this when he says *"Whatever the reasons, many classroom teachers are becoming responsible for an everwidening diversity of students, and they are not going to be able to meet the needs of these children without making some changes."*

Because of their geographical location, and sometimes because of finances, many band operated and rural schools find it very difficult to obtain the services of consultants and clinicians. Special needs go unaddressed and the classroom teacher is placed in such a position that they have to decide who is going to receive the attention they need, the

high achiever, the average achiever, or the at-risk type.

Over the years schools in native communities have come under criticism from community members for the high drop out rate and the low number of high school graduates (people questioning whether students were academically prepared). Then in 1991 a major announcement from Brandon School Division reaffirmed the fear of the community. In brief, the Brandon School Division indicated they had identified a significant number of aboriginal students from the concerned community as needing extra help in the form of a language development program because quite a few students were encountering problems with their studies when they had transferred into the urban school. The remedial program would cost the educational authority an extra $390.00 per student per year. The education authority was very reluctant to pay for this program without some type of justification as to how these students were identified because English is *not* a second language in the community and all these students had been taught, by provincially certified teachers, the provincial curriculum in facilities that more than meet provincial norms.

An arrangement was made with Brandon School Division to identify students recommended for placement in this program. The task of recommendation fell upon classroom teachers. It was decided that

student performance in the classroom and the annual standardized test results would serve as determinants.

Since 1991, grades 3,6, and 9 have been tested in the math, science and language arts curricula based on provincial curriculum quidelines. These exams were prepared and analyzed by an outside contractor and administered by the teaching staff in May. The results were reviewed by the contractor with the staff members to ensure everyone was familiar with the material, methods, and interpretations.

The concerned school from the reserve also utilizes the *Canadian Test of Basic Skills* as an instrument to assess its students annually. The results are mechanically scored by the publisher and returned to the school where the teachers review them and share the information with the parents during a parent-teacher interview. The information provided may serve as an indicator to what type of program and curriculum would be best suited to students. Johnstone (1981) however, recommends that caution be taken about student achievement, because the performance reflected in standardized test scores is not a unitary construct but a set of interdependent components representing degrees of knowledge of various subject areas. Weaknesses in one area affect weaknesses in another; likewise, strengths in one area reinforce strengths in other

areas. In the same study, Johnstone identified vocabulary as a key component of achievement related to ethnic group differences on the standardized test. The fact that some individuals with culturally different backgrounds do not score well on these tests has led to charges that the tests are culturally biased (Best and Kahn, 1989).

Santin (1996) reported that parents and teachers of ESL students voiced a similar concern over the provincial English language arts exam which constituted thirty percent of their final grade.

Recognizing the potential of the computer as an educational tool, the Department of Indian and Northern Affairs Canada and the educational authority of the southwestern reserve jointly purchased fifteen Macintosh computers and two printers for the grade junior high writing program. Software was obtained free of charge as the result of an agreement between Winnipeg's River East School Division, Apple Canada, and Manitoba Education and Training. While the program is distributed by Tronica Computers of Winnipeg, inservice training was provided by teachers in River East School Division on the software's capabilities and methods of implementation.

1.2 Statement of the Problem

Teaching students to proficiently read and write has always been

one of the biggest challenges a classroom teacher faces. Ill-developed writing skills affect success both in the classroom and later on, in the workplace. Roberts & Samuels (1993) indicate that failure to achieve the basic skills of writing may have far-reaching effects on a student's motivation, self-image, and employment prospects.

This study investigated whether a computer-assisted instruction program, emphasizing thinking and writing, would improve the writing skills of aboriginal students when compared to a similar group of aboriginal students that received conventional writing instruction using pencil and paper.

1.3 Definitions

At-Risk Learner - Pratt (1994) describes an at-risk learner as a student experiencing serious academic, intellectual, behavioral, emotional, social, or psychological difficulty.

Computer-assisted Instruction - Cross and Toews (1989) describe the KnowledgeBuilder™ software program as an integrated learning environment that is designed to help students improve the quality of their expository writing and research. It is a program of seven integrated software tools that help students create their own Knowledge Bases, plan and organize for writing, compose draft editions, and publish

final reports.

General Impression Marking Scale - GIM is a judgment about the overall quality of a students' writing given the purpose of the writing and the audience to which the writing is addressed (in the provincial tests, the audience in every case is a student's classmates). The GIM scale attempts to rate compositions in a general, global manner. Areas covered include the quality of thought evidenced in the paper, the effectiveness of the overall organization, the effectiveness of the overall presentations, and the effectiveness of style and word choice. The marking scale consists of "High", "Middle", "Low", and "Insufficient" categories.

Standardized Test - A test that has a consistent and uniform procedure for administering, scoring, and interpreting the subject's behavior/performance. For the purpose of this study, the standardized test refers to the *Canadian Test of Basic Skills.*, the language arts component of which was adopted as measures of the English language proficiency for students prior to experimentation.

1.4 Purpose of the Study

The purpose of the program is to access the relative effect of computer-assisted instruction on the writing skills of aboriginal students as compared with traditional instruction. This study is significant

because although research literature suggests that computer-assisted instruction is an effective way of teaching, there is no literature available on studies conducted involving aboriginal students and CAI.

Adopting computer-assisted instruction is significant for other reasons as well. A goal of the school is to prepare students for the transition from the community school to the urban high school and the provision of this experience should assist in making their transition more successful. Furthermore, the study offers an opportunity to observe the application of computer-assisted writing instruction in an aboriginal school and this can either verify or dispel the stereotyping of the aboriginal students being computer-illiterate.

1.5 Research Question

By conducting this research it was hoped to answer the following question: Will the writing and language arts skills of aboriginal students using the KnowledgeBuilder™ software program improve at a faster rate when compared to the pencil and paper method of expository writing?

1.6 Limitations of the Study

The major limitation of this study was the small number of experimental as well as control groups of students. Although six schools were contacted, only one would cooperate with this study. (Many remote

and band operated schools refuse to participate or release information for studies.) Other factors which should be taken into account are:

a. As a director of education, the researcher had difficultly at times maintaining a "hands on" type of control. Efforts had to be coordinated through the principal, making it somewhat awkward to properly manage or be directly involved in the implementation process.

b. The use of standardized tests with aboriginal students (and minority groups in general) has often been questioned because of the high probability of being biased as they are a reflection of the dominant society's values.

c. Because of their familiarity with both the subjects and the researcher, the experimental teachers may have tried to please the researcher resulting in a form of contamination referred to as the "halo effect". "When we are aware of a student's performance on another variable, or even aware that the student is in a treatment group, this knowledge can influence or contaminate our observation" (Moore, 1983, p. 176)).

1.7 Overview of the Study

The following section of the study is organized into four chapters.

- Chapter two consists of the review of related literature.
- Chapter three provides the description of research methodology, research design and data collection, processing and analysis.
- Chapter four discusses the results of the study and the interpretations that were made based on the data collected.
- Chapter five summarizes the approach and findings and presents recommendations for future use of the KnowledgeBuilder™ program.

Chapter Two

Literature Review

2.0 Introduction

> *"If human beings are lucky, fifth generation computers will keep them as pets."*
>
> Unknown Scientist

In the past fifteen years many teachers have adopted the computer as a major teaching tool in a variety of subjects or topics. Selfe (1986) says that more teachers are discovering that when it comes to teaching grammar and usage, the computer can accommodate more students, with more repetitions, than the most patient teachers can. These programs free teachers for the more difficult tasks in the classroom - motivating students, dissemination of information, holding individual conferences, organizing small group work, and the assessment of students' progress and achievement.

2.0.1 Strengths and Weaknesses of CAI

Table 1 summarizes strengths and weaknesses identified by Vockell and Schwartz (1988, p. 8) associated with the computer when compared to two other major medias; printed materials and audiovisual materials. Tutorials, drills, and simulations are not considered as they can be intregrated through any of these approaches.

Table 1

The Strengths and Weaknesses of CAI Compared to Printed and Audiovisual Materials

Printed Material

Strengths	Weaknesses
• The learner controls the rate of presentation.	• The materials cannot enforce the rate of presentation.
• The learner can review previous information as needed.	• The graphics are static and likely to be uninteresting and inefficient in focusing attention.

Audiovisual Materials

Strengths	Weaknesses
• The graphics can be realistic and interesting.	• The learner cannot control the rate of presentation. The learner cannot backup and review information.
• The graphics and sound can focus attention effectively.	

Computers

Strengths	Weaknesses
• The learner can either control the rate of presentation or leave it up to the computer.	• Computers are more expensive than other media.
• The computer permits the learner to review previous information.	• Many teachers are unfamiliar with the computer.
• The computer provides inique information or prompts as needed.	
• The graphics can be realistic and interesting.	
• The graphics and sound can focus attention effectively.	
• The computer can require interaction, eliminating passive observation.	
• The computer can provide immediate feedback.	
• The computer can record student performance.	

Note. From The computer in the classroom (p. 8), by E. Vockell and E. Schwartz, 1988, Santa Cruz, CA: Mitchell Publishing Inc.

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A perceived advantage of drill and practice software is that it enables unskilled students to work on one skill at a time. They can focus on verb forms or commas as long as they please without having to write a whole essay (Constanzo, 1989). Constanzo also cited the computer's infinite patience and points out that many students feel less anxious about making mistakes with a machine than they would with a human tutor.

Along with the incorporation of many factors that effect instruction, these interesting and well-designed programs motivate the students and ensure high student time on task. Letters can be any size. Words can flash into view or march across the screen. The addition of sound and animated figures creates sensory stimulus. Smith et al. (1984) found that the students find the graphics amusing and some of the fear of the subject matter is removed. Pratt (p. 210) stated that, when up to a thousand hours of planning can go into one hour of software, the instruction can be designed with sensitivity and a variety of strategies.

2.1 Social Literacy

The computer can serve as a powerful weapon in the war against illiteracy. Today's physically challenged students use specially designed computers and software to write and communicate in the classroom

(Tougas, 1987). Watson (1990) feels the computer can offer access to new curriculum to special needs students or it can enhance existing curriculum.

In regards to the equity of the use of the computer in the classroom, Sutton (1991) found the poor, minority, and female students had the least amount of access time to computers at home and at school. His findings are supported by Apple (1986) who found there is evidence of class, race, and gender-based differences in computer use. Campbell (1984) summarizes the situation in a very clear manner:

> While stories abound about students who will do just about anything to increase their access to computers, most youngsters working with school computers are (economically advantaged), white and male. The ever-growing number of private computer camps, after-school and weekend programs serve middle class white boys. Most minority (and poor) parents just can't afford to send their children to participate in these programs.

In the United States over 67 percent of the schools in affluent areas have computers compared to only 41 percent of the poorer public schools.

The class, race, and gender inequities will occur because of traditional school practices such as tracking or streaming. Students in vocational and business tracks will learn operating skills for the word processor and will consist of working class young women (Valli, 1983). Students in academic tracks that focus on general programming abilities

will be disproportionately male (Olson, 1985). Also, Fomin (1984) found that since computer programs usually have their base in mathematics and sciences, gender differences can be heightened even more given the often differential treatment of girls in these classes. This is in contrast to the experimental school where each junior high student receives computer awareness and keyboarding instruction in four forty-minute weekly scheduled labs and an undetermined amount of class time is allocated for computer-assisted instruction. Students also have access to computers during noon hour and after school whenever they request it. Resource teachers have computers in their rooms with a wide variety of software and the library has a computer and printer for research purposes. One computer room has twenty six computers and four printers and is capable of putting twelve computers on-line at the same time, the other has fifteen Macintosh computers and two printers for use with the KnowledgeBuilder™ software program.

2.2 Computer-Assisted Instruction

Because today's educational software is so well-designed, the student receives nearly immediate feedback and if they require extra work, the computer can provide it immediately, making it more valuable than the conventional worksheet. These programs are so designed to far

outlast the patience of a teacher, especially when dealing with students having different levels of ability. Mokros and Russell (1986) feel that learner-centered computer programs have particular pedagogical characteristics which place more cognitive control in the hands of the user. This is possible because the software is often versatile enough to be incorporated into different subject areas and used for a variety of purposes by students who approach learning in different ways. Chambless and Chambless (1994) sanction computer-assisted instruction when they say it gives classroom teachers a powerful instructional tool for teaching reading and writing to K-2 students.

Smith, Kiefer & Gingrich (1984) report that the style of computer assisted instruction for writers began to change in the early '80's. The new approach deviates from programmed texts and canned exercises to focus on the writer's own work, it offers writing aids to facilitate more rapid and successful writing. This style is referred to as an interactive process program.

2.3 The Interactive Process

The interactive process writing approach, according to the U.S. Dept. of Education (1986), is called "the most effective way to teach writing". The process involves arranging the learning environment so the children

think themselves as authors and engage in the same processes as mature authors (Graves, 1983). Writers move through a series of stages as they compose. They choose their own topics, define their purposes and audiences, draft and revise based on feedback from their teachers and peers, and even publish their work in some form. This places the emphasis on the process, not the product, thereby encouraging the interaction of thinking, writing, and reading.

2.4 Writing Software

Writing software varies from the barest of word processing (basically, just a typewriter with a screen that you can cut and paste with) to a complete writing package that not only checks spelling and grammar but a host of other functions like providing comments or choices on word selection i.e., the use of I, we, or the last name of the author in lieu of "the author". Software programs are available for writers of all abilities and ages, from the pre-school child to the graduate student or professional writer.

2.5 Research Concerning Computers and Writing

Bender (1988) found that after being scheduled into a computer-assisted instruction program directed at improving thinking and writing skills, the students of a Philadelphia inner-city school with a population

consisting mainly of minority at-risk students, improved their writing skills and that their attitude towards writing with a computer, as well as their attitude towards the library, became very positive. Several studies (Harper, 1987-88; Rodrigues & Rodrigues, 1986; Shurbutt, 1987) support these findings and remark on findings of improvements in spelling and the editing methods of the students. Studies conducted by Freeze (1990,1991a, 1991b) in the classrooms of Winnipeg's River East School Division determined that combining the Writing for Meaning strategies and the KnowledgeBuilder™ program was an effective vehicle for teaching middle years students to think and write using computers. He reported that both, the content specific writing skills associated with the units of instruction and the more general reflective writing and process skills, were positively affected. The daily work of the students reflected the same positive measures as the post-test.

In his article, Lake (1985) predicted:

> The 1990s would provide some exciting innovations for writing instruction as teachers and administrators begin to perceive the benefits and effectiveness of establishing internal and external mail systems. Students would have access to distant audiences and teachers would not have difficulty managing numerous "floppy disks." Most writing would be stored centrally within students' "folders." Another important tool would be the "multiple forwarding" options of these systems would allow for "writing across the curriculum." (p. 74)

This is happening today in Manitoba. The information highway, Internet, has the capability of allowing students to submit written assignments electronically and networking students nationally, as well as internationally. It serves as a vehicle or mechanism to promote dialogue between different parts of the country in a split second. Friendship is developed and hours are spent on the computer without the student realizing it (Wild, 1996).

2.6 Summary

The past two decades have seen vast changes in the methods and media of communication and education, due mainly to the rapid development of technology. Computers and software are valuable teaching tools in today's classrooms over a broad range of subject areas. The software is developed to incorporate many different aspects of learning, motivation, instant feedback, and evaluation. With the financial restraints in education today and the diversity of the learning capabilities of the students in the classroom due to mainstreaming, the computer is a tool that every teacher should become familiar with and use in the classroom.

While all the studies that have been conducted elsewhere, support the notion of using computer-assisted programs, there is no literature available on the use of computer-assisted instruction and its outcomes on

the aboriginal student writing achievement. The objective of the present project, therefore, is to fill in a missing gap in the literature reviewed.

Chapter Three

Methodology

3.0 Introduction

This study investigated the effectiveness of the computer-based writing program using the Apple Macintosh computer with grade 7-9 students of two southern Manitoba band operated schools. Primarily quasi-experimental in design, the study attempts to compare the computer based KnowledgeBuilder™ program with more traditional instruction in their relative effectiveness of improving students' writing.

In the first method, the students were exposed to the KnowledgeBuilder™ software program supplemented with traditional writing instruction. In the second method, students strictly followed the traditional instruction using pencil and paper.

Both groups were pre-tested with the Canadian Test of Basic Skills prior to the commencement of their writing instruction. At the end of the school year, the test was re-administered again as a post-test. An analysis of variance (ANOVA) was performed on the mean scores of the language arts and writing for students in both groups to determine whether there was a significant difference. The quasi-experimental design was diagrammatically summarized in the following:

Table 2

Description of a Quasi-Experimental Research Design

Non-equivalent Control Group Design

$$\frac{O\ X\ O}{O\ \ O}$$

Experimental Group (Grades 7, 8 & 9)	Control Group (Grades 7, 8 & 9)
Pre-test	Pre-test
↓	↓
Writing Instruction & CAI	Writing Instruction & Pencil/paper
↓	↓
Post-test	Post-test

3.1 Description of the Setting

The schools in each community are relatively new, both opened in 1987. The facilities are well equipped and in many instances they well exceed provincial norms. The teaching staffs are divided, native and non-native, with the early years classrooms being staffed largely by the native staff and the junior high staffed by predominately non-native teachers. The provincial curriculum is taught.

3.2 Subjects

The two schools participating in this study are located on Indian

reserves in Southwestern and south central Manitoba. Neither school goes beyond grade nine, therefore, any student going on to high school has to leave the reserve to continue their education in urban centres nearby.

Each of these schools are designed and staffed in such a manner that all the students of a grade level or age are placed homogenously. The enrollment of these schools are wholly aboriginal in nature and this study will include all the students in each grade . Although both schools are staffed with a mixture of aboriginal and non-aboriginal teachers, the junior high courses are taught by Caucasian teachers.

Both groups come from communities where the unemployment rate is excessively high so there is not noticeable difference in the socioeconomic status. However, the number of at-risk students in each group is not known.

Table 3

Comparison of Experimental and Control Groups by Grade, Number, and Gender

Variable	Experimental School (Computer-assisted instruction)	Control School (Traditional Writing instruction)
Grade Seven		
M	12	7
F	11	5
Total	23	12
Grade Eight		
M	10	5
F	7	4
Total	17	9
Grade Nine		
M	5	1[a]
F	4	5
Total	9	6
Group Total		
M	27	14
F	22	14
Total	49	27[b]

[a]One student in this group did not complete the pretest battery giving this subgroup a participating enrollment of 1. [b]Because one male student did not complete the pretest battery the actual number of participants in the control group is 27.

3.2.1 Experimental group

The subjects for the treatment program were the 49 junior high students (7-9) of a southwestern Manitoba band operated school with ages ranging from 11 yrs. 10 mos. to 16 yrs. 6 mos. at the time of the pre-test.

Table 4

Description of Experimental Groups by Grade, Gender, Number, and Age at Time of Pretest

Grade	Gender	N	Mean Age	Minimum Age	Maximum Age
			yrs mos	yrs mos	yrs mos
7	Female	11	12 6	11 10	13 4
7	Male	12	13 1	12 1	14 10
7	Total	23	12 10	11 10	14 10
8	Female	7	13 6	12 11	14 5
8	Male	10	13 10	12 11	15 9
8	Total	17	13 8	12 11	15 9
9	Female	4	14 8	13 10	15 4
9	Male	5	15 2	13 11	16 6
9	Total	9	14 11	13 10	16 6
7-9	Female	22	13 6	11 10	13 4
7-9	Male	27	14 1	12 1	14 10
7-9	Total	49	13 10	11 10	16 6

From Table 4 the grade seven class of the experimental school has an enrollment of 23 students, 11 female and 12 male, ranging in age from 11 years 10 months to 14 years 10 months. Using the composite score of

the complete pre-test battery, Table 5 indicates student ability ranged from 4-7 to 8-4 (grade four-seventh month to grade eight-fourth month). School attendance records indicate the average daily attendance for this class was 88 percent for the previous year.

The grade eight class of the experimental school has an enrollment of 17 students, 7 females and 10 male, ranging in age from 12 years 11 months to 15 years 9 months. Student ability ranged from 5-4 to 9-4 (grade five fourth month to grade nine fourth month). The average daily attendance for the previous year was 86 percent.

The grade nine class of the experimental school has an enrollment of 9 students, four female and five male. The ability range of this class is from 5-7 to 8-4 (grade five seventh month to grade eight fourth month) using the total battery composite grade equivalency scores. The average daily attendance for the previous year was 88 percent.

Table 5

Description of Experimental Group by Grade, Gender, Number, and Writing Ability at the Time of Pre-test

	Grade 7	Female	Male	Variance F-M
N	23	11	12	
Mean GE	6.3	6.7	6.0	0.30
Minimum GE	4.7	5.9	4.7	0.72
Maximum GE	8.4	8.4	7.3	0.60
	Grade 8	Female	Male	Variance F-M
N	17	7	10	
Mean GE	7.3	7.5	7.2	0.07
Minimum GE	5.4	7.1	5.4	1.44
Maximum GE	9.4	8.0	9.4	0.98
	Grade 9	Female	Male	Variance F-M
N	9	4	5	
Mean GE	7.1	7.1	7.1	0.00
Minimum GE	5.7	6.1	5.7	0.08
Maximum GE	8.4	7.6	8.4	0.32

Note. GE= Grade Equivalency scores as obtained from the pre-test battery's composite score. Variance F-M indicates the variance between

the female and male scores.

3.2.2 Control group

The control school is somewhat smaller with a junior high enrollment of 28. From Table 6 the grade seven class was composed of 12 students, 7 male and 5 female students. The achievement levels range from 4-6 to 7-3, with a mean score of 6-0. These grade equivalencies were obtained from the composite scores of the pre-test battery. It was not possible to obtain the ages of the students nor the attendance patterns of the control school.

The grade eight class has 4 female and 5 male students for a combined enrollment of 9. The achievement levels for this group, as obtained from the composite scores of the pre-test battery, range from 4-8 to 7-3 grade equivalency, with a mean of 6-1.

The grade nine class has an enrollment of 7 but one student did not participate in the pre-test. The six participating students consisted of 1 male and 5 female students. The achievement level for this grade range from 5-8 to 9-8, with a mean grade equivalency score of 7-6.

Table 6

Description of Control Group by Grade, Gender, Number, and Writing Ability at the Time of Pre-test

	Grade 7	Female	Male	Variance F-M
N	12	5	7	
Mean GE	6.0	5.4	6.4	0.45
Minimum GE	4.6	4.6	5.4	0.40
Maximum GE	7.3	5.8	7.3	1.12
	Grade 8	Female	Male	Variance F-M
N	9	4	5	
Mean GE	6.1	6.3	5.9	0.11
Minimum GE	4.8	4.9	4.8	0.00
Maximum GE	7.3	7.3	6.4	0.40
	Grade 9	Female	Male	Variance F-M
N	6	5	1	
Mean GE	7.6	7.8	6.9	0.37
Minimum GE	5.8	5.8	6.9	0.60
Maximum GE	9.8	9.8	6.9	4.20

Note. GE= Grade Equivalency scores as obtained from the pre-test battery's composite score. Variance F-M indicates the variance between

the female and male scores.

These students received their writing instruction in the traditional manner and used the same reading and language arts program as the experimental school. The in-class writing assignments and exercises were similar in content to the work being done in the computer-assisted class.

3.3 Treatment of Experimental Group

There were two primary differences between students coming from the two schools. First, a good portion of the experimental group's class time was preoccupied by work with instructional software in the computer-assisted classes. Second, while the students in the control school practiced composition at the chalkboard and with paper and pencil at their seats, students in the experimental school practiced composition using the KnowledgeBuilder™ writing software.

The students and staff of the control group were not informed, nor were the students of the experimental school, that they were participating in a research project and there was no contact among the students of both groups because of the distance between the two communities.

3.4 Validity

To enhance the validity of the study the experimental group was not informed so as to eliminate the possibly of the Hawthorne effect contaminating the study. Quite often when competing with other levels of the independent variable or treatment, the group receiving the treatment might feel they were the chosen few. The uplifted morale may increase their motivation to achieve and succeed. They may alter their academic lifestyle by increasing their study time, they may become more attentive in class, assignments are completed with more care, and they become motivated in the spirit of trying to "beat" the control group (Best and Kahn, p. 113).

Teachers in a control group tend to perform better for the duration of the study. They are better prepared, organized, and motivated in an attempt to prove that way of teaching is as good as any other (Moore, p. 152). He also goes on to say that the control group teachers may contribute to an experimenter effect since their behavior may have a positive influence on the students. Moore cites Rosenthal's (1966, p. 212) distinction between active and passive experimenter effects. Active effects relate to differences in the experimenter's behavior that can influence the subject's behavior. These differences may be reflected in

such things as facial expressions, random encouragement, and social reinforcement. They can also include annoying habits of speech or softly repeating the subject's responses. Passive experimenter effects relate to an experimenter's appearance rather than behavior. Such passive effects as the experimenter's age, sex, ethnicity, height, weight, and so forth, may change a subject's behavior in a study.

3.5 Criteria

The scores obtained from the language arts component of the Canadian Test of Basic Skills were used to determine the effect of computer-assisted instruction on the writing skills of aboriginal students. Supplementary data in the form of experimental grade 9 class results of the provincial writing examination is provided for a year-to-year comparison of achievement.

3.5.1 Canadian Test of Basic Skills

The Canadian Test of Basic Skills has been administered annually in each school for years. This somewhat eliminates the novelty or interruption effect that could result if this had not been part of their regular schooling experience. While the students completed the whole battery of tests only the composite scores of the language arts components were used for the pre and post-tests data. The language

components that were tested were:

1. Spelling
2. Capitalization
3. Punctuation
4. Usage

The students wrote the pre-test in May of 1994 and the post-test in May of 1995. The tests were machine scored and the grade equivalent scores were used in the comparisons.

3.5.2 Provincial Writing Assessment

In addition to the CTBS assessment, each spring the experimental school conducts a writing assessment with its grade 9 students as a means to monitor the writing processes of the students. This assessment is a result of the provincial government's decision to exclude federal and band operated schools in their provincial assessment program. The local educational authority instituted it as a means of assessing the writing skills of the grade nine students, the control school did not participate in this type of assessment.

An outside contractor is hired to prepare the assessment based on the previous years provincial writing examination. The examinations are administered by the teaching staff and the analyzed by the contractor who uses the same marking system as the province, the General Impression

Marking (GIM) system.

3.5.3 General Impression Marking (GIM)

General Impression Marking is a judgment about the overall quality of a student's writing given the purpose of the writing and audience to which the writing is addressed (in the provincial tests, the audience in every case is a student's classmates). The following information describing the system is taken directly from the test booklet that accompanies the assessment.

> Part II - Narrative Writing
>
> Directions: Narrative writing is writing that tells a story. Most stories tell a series of events that the writer has experienced or imagined. Good stories have a number of elements: a clearly described setting (time and place), an exciting or interesting beginning, a strong central character or characters, a clearly understandable set of events, an interesting conclusion.
>
> Below is given a story beginning. Think about the opening and imagine what could happen. Then write a story about what may happen next. The paper should include three or more paragraphs, and you will have 50 minutes to write your story. You may wish to write a rough draft on paper given to you by your teacher and then copy your final draft into the test booklet. Write your story as if you were telling it your class.
>
> Story Beginning:
>
> Chris just stood there. His (or Her) legs refused to move. Sweat broke out on his (or her) forehead.

Table 7 is an example of a narrative writing with the GIM and

analytical scores applied.

The scorer then applies the GIM scale which attempts to rate composition in a general, global manner. Areas covered include the quality of thought evidenced in the paper, the effectiveness of the overall organization, the effectiveness of the overall presentation, and the effectiveness of style and choice. Table 8 explains the procedure and criteria for the GIM Scale.

Table 7

Example of the General Impression Marking Scale

Chris just stood there. The legs refused to move. The sweat broke out on his forehead. Before long he was trembling, so afraid he couldn't move. When the bear came closer towards him he was frozen with fright. He thought, "what will I do, he's coming towards me." You could see the cold frighting look in that bear's eyes, when he was coming towards Chris. Suddenly there was silence for a couple of minutes. Chris made it to move back away from the bear. Chris kept on moving backwards further and further until the bear decided to leave.

Chris ran the other way, towards his camp. Whe he got there he fell beside the tent, where his mother and father were. They heard the thump sound and came running out. His father said, "What is going on Chris?" Chris didn't answer because he was out of breath. Chris's parents rushed towards him. They picked him up, and carried him into the tent.

That night he woke up, with his parents both sitting at his side. "How are you feeling" his mother asked? "I'm feeling okay," Chris said. He told the story to his parents. The next morning he was told not to leave the camp. He had his breakfast and snuck away from his parents.

He was very sorry thow, when he met up with the bear again. He said to himself, "why did I leave camp when I was told not to." The bear didn't see him the first time and went the direction. When Chris saw go the other direction he took a big breath and said "thank God!" Chris went down to the River to catch some fish. He was there for about a half of an hour, and caught five fish.

Chris layed the fish on the bed rock beside the river. Well the old bear decided to go back to the River. When the bear got closer to the river he could smell the fish and knew there was someone there. The bear came over the hill and saw Chris fishing. He made a noise and came down the hill like roaring thunder. Chris yelled out a big scream, just when he father came around the big rock and shot the bear dead. Chris fell to his knees out of breath. He thanked his father for saving his life. His father said "don't thank me thats what I am here for." There all had a happy summer at camp ever since then.

GENERAL COMMENTS:

This paper shows thinking on the part of the writer that is appropriate to the grade nine level. The writer has a central focus and maintains it throughout the piece. The ideas and events are generally sequenced in a meaningful way, although more effective transitions would have added the reader in following them. Although the ideas presented are generally sound, they do not reflect a unique or creative approach to the topic. The style is generally clear and the word choice, for the most part, is at the expected grade nine level. The details chosen are appropriate, but the writing seems to lack life. Sentence structure is awkward at times, although there is evidence of control of a number of sentence structures. Spelling errors appear but they do not detract from the impact or readability of the paper. Errors in capitalization, punctuation and usage detract slightly from the paper and the reading is weak.

G.I.M - 4 (Middle)

Analytic Scales

1. Organization & Sequence	4
2. Wording and Style	3
3. Focus or Theme	3
4. Ideas	3
5. Choice of Detail/Elaboration	4
6. Sequence Structure	2
7. Usage	3
8. Capitalization & Punctuation	4
9. Spelling	2

Note. From Grade nine writing assessment test booklet. (pp. 27-28). by Manitoba Education and Training, 1983. Winnipeg, MB: Government of Manitoba. Reprinted with permission.

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Table 8

Explanation of General Impression Marking Criteria

General qualities and suggested scores are listed below:

5 or 6	High
3 or 4	Middle
1 or 2	Low
XX	Insufficient Information

The criteria for these categories is:

HIGH (5 or 6): The paper evidences sound thinking on the part of the writer. The quality of thought reflects a mature point of view. The organization of the paper indicates careful planning and thinking on the part of the writer, and the paper is presented in an effective, meaningful fashion. The style is appropriate to the level of thought and organization of the paper, and the word choice and use reflect a mature, sophisticated grasp of language and language use. The level of the paper is appropriate for the audience being addressed (in this case, a students' classmates) and fulfils the identified purpose.

MIDDLE (3 or 4): The thinking of the writer seems appropriate to the grade level of the student but reflects a level of maturity less than adult-like. The organization of the paper is generally appropriate, though the writer might have been more careful in planning and carrying out an organizational pattern. The thinking, for the most part, is meaningful, but at times, the paper may wander from the central point thrust or movement. The style, though generally appropriate to the level of thought and organization of the paper, may reflect some inconsistencies or repetitions to the point of being, at times, distracting. Word choice reflects the level and maturity of the student but may not, at all times, be appropriate to the audience to which the paper is addressed. In general the paper achieves its identified purpose, but it may wander or not take advantage of obvious opportunities in achieving that purpose.

LOW (1 OR 2): The thinking evidenced in the paper seems inconsistent and immature reflecting an identifiable egocentric point of view. The organization of the paper is difficult to follow and does not reflect any careful planning or any meaningful organizational pattern. The thrust or movement of the paper is interrupted by wandering discourse, unnecessary asides, or inappropriate information. The style is inconsistent and immature, and repetitive or uninteresting structures are consistently used. Word choice is inappropriate, distracting, and shallow. The writer seems to have little consideration for the audience or reader and does not consistent address himself/herself to the identified purpose of the paper.

Note. From Grade nine writing assessment test booklet. (pp. 14-16). by Manitoba Education and Training, 1983. Winnipeg, MB: Government of Manitoba. Reprinted with permission.

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Having been employed with the assessments branch of Manitoba Education and Training, the contractor for this assessment was very familiar with the assessment, its administration, and the scoring and analysis of the results.

3.5.4 The Writing Assessment

Sigurdson (1995) describes the writing test as being divided into four parts: Spelling, Story Writing, Sentence Writing, and Writing Directions. The Story Writing section of the test was given seven separate scores. Each of these scores was evaluated on the basis of a High, a Middle, and a Low score. The first of the seven scores was based upon a General Impression of the student's work. The remaining six scores were labelled as analytical scales and Sigurdson named:

1. Organization and Sequence
2. Word Choice
3. Focus or Theme
4. Sentence Structure
5. Usage (grammar)
6. Spelling

(It is interesting to note that while the province uses the GIM and nine analytic scales Sigurdson uses the GIM and six analytical scales).

Part one of this test was a spelling assignment. Part two involved writing a short story. Students were given a situation and were asked to write a few paragraphs on the situation. Part three of the test involved

the construction of sentences. Some sentences were to be developed from one or two simple sentences; others involved the unscrambling of words to form appropriate sentences. Some of the sentences were also evaluated on the basis proper punctuation and capitalization. Part four of the test was another writing assignment that was evaluated on the same basis as Part Two.

3.6 Hardware

With the recent development of low-end mini and personal computers, classroom laboratories equipped with these computers are now within range of most school academic budgets. The experimental school provided 15 Macintosh Classic and Color Classic computers along with 2 laserwriter printers for use in this study.

All the hardware was kept in a science laboratory. Students also had access to these computers if the laboratory was vacant and they were excused from whatever class they were taking at the time. Because the laboratory was only used for science three periods a day, composition classes were scheduled in the science laboratory one period a day for each grade, allowing the class to access the computers for their writing instruction and other expository writing assignments.

Through their previous computer awareness courses and keyboarding

training, the students have a fairly good working knowledge of the computer and the word processing program functions. They can begin at once to set margins, reformat text, underline words, delete characters, open spaces, and so on. These user friendly computers permit the students to enter and edit their first writing assignments after just a short lesson or two of familiarization.

The printers can prepare perfectly typed writings without correction tape, white-out, erasures, or typing errors. There is very little maintenance short of changing an ink cartridge or adding paper for the printer and an annual cleaning of the keyboard and power unit.

3.7 Software

Computers are becoming indispensable tools to the composition classes because of developments in software. The KnowledgeBuilder™ software is designed to increase the quality and production of student writing across the curriculum. The program contains four windows which can be opened individually or in combination on the same screen. The "Knowledge Base" window acts like an electric interactive resource book which students or teachers can use to access, input, withdraw, and reference information. The "Organizer" window is designed to prompt students' organizational skills to map concepts, write outlines, or conduct

research. The "Draftwriter" window guides students through the composition process and may be used in combination with the Knowledge Base or Organizer windows on the same screen. The "Publisher" window offers a wide selection of editing and formatting features and enables students to print their final product, save it to the Knowledge Base or send it electronically to the instructor or another audience.

This software incorporates fifty eight writing strategies. These strategies comprise a complex and reflective conceptualization of the writing process. They are designed to help students generate, compose, and revise their writing. Collectively, they detail the thought processes, organizational skills, writing formats, and technical writing skills students require to be effective writers.

After receiving instruction on the functions of the software at the beginning of the year, the students used the program for all their expository writings.

3.8 Procedure

The experimental staff underwent three days of training with teachers of River East School Division in Winnipeg. These sessions introduced the software and demonstrated the integration of the software into the writing program. The users guide that accompanies the software

was referred to frequently and the teachers were encouraged to participate in their host's classes. The experimental school hosted a group of these teachers and students as an attempt facilitate a form of peer coaching and to demonstrate the capabilities of the program to the students of the experimental group.

The students from each school were pre-tested in the spring of 1994 with the Canadian Test of Basic Skills battery. At the beginning of the school year the students from the experimental school were introduced to the KnowledgeBuilder™ program and used it in all their expository writings throughout the year while the control school used pencil and paper or a conventional word processing program for their written submissions. Both schools received traditional writing instruction as part of their language arts program and the provincial curriculum is followed in both schools. In the spring of 1995 the students of both groups were assessed again with the CTBS, an ANOVA was applied to the results of both sets of assessments and the results compared to determine whether or not there was a significant improvement in the writing achievement of the group using the CAI.

While the Grade 7 & 9 pre-test results indicated there was no significant difference in the writing skills of the two groups (See Chapter

4 to follow), the Grade 8 reults indicated a significant difference existed.

3.9 Grade 8 Pretest analysis of Variance

Table 9

Summary of Analysis of Variance for Grade 8 Pretest

Source of Variance	SS	df	MS	*F*
Between-groups	10.28	1	10.28	9.78*
Within-groups	25.53	24	1.05	

*p<.05

Table 9 indicates that the Between-group variance of 10.28 is large relative to the Within-group or error variance of 1.05 obtaining a statistically significant *F* ratio of 9.78 p<.05. Because of this finding the Grade 8 subjects were removed from the study at this time as it would be difficult to attribute any change or improvement in the writing skills to the treatment.

3.10 Conceptual Hypothesis 1

Computer-assisted writing instruction is a superior method of teaching writing skills to aboriginal students at the grade 7 level.

Rationale:

The computer-assisted instruction software, KnowledgeBuilder™, is designed to help students think and write so they may plan better and prepare their expository writings more effectively than the traditional approach of teaching thinking and writing skills.

3.10.1 Operational Hypothesis 1

Computer-assisted writing instruction is more effective than the traditional approach of the teaching of writing skills to aboriginal students at the grade 7 level.

3.10.2 Mathematical Hypothesis 1

No significant difference is to be found between the computer-assisted writing instruction method and the traditional method of writing instruction on the writing skills of aboriginal students at the grade 7 level.

3.11 Conceptual Hypothesis 2

Computer-assisted writing instruction is a superior method of teaching writing skills to aboriginal students at the grade 9 level.

Rationale:

The same rationale as for the Conceptual Hypothesis 1 applies as the program does not change from grade to grade.

3.11.1 Operational Hypothesis 2

Computer-assisted writing instruction is more effective than the traditional approach of the teaching of writing skills to aboriginal students at the grade 9 level.

3.11.2 Mathematical Hypothesis 2

No significant difference is to be found between the computer-assisted writing instruction method and the traditional method of writing instruction on the writing skills of aboriginal students at the grade 9 level.

3.12 Summary

This chapter described the methodology and design of this study. The school setting and the subjects involved were introduced. The considerations to ensure the validity of the research study were taken. A detailed explanation was given in terms of the procedures of carrying out the quasi-experimental study. Means of assessing the writing abilities were explained. And, two major hypotheses were advanced.

Chapter Four

Results of the Study

4.0 Introduction

This chapter will be divided into five sections. The first section provides rationale regarding the statistical method used to analyze data for this study. In the second section, the results of the pre-test are reported while the third section reports the results of the post-test. The fourth section will report on the comparison of the two groups and the fifth section will summarize the overall findings.

4.1 Analysis of Variance

In single classification, or one-way analysis of variance, the effects of different instructional method on writing scores is examined to determine whether the performance outcomes of two groups of students are not due to chance alone. The one-way analysis of variance (ANOVA) was applied to the mean scores of the subjects' CTBS results after the two groups had been exposed to different instructional strategies. The choice of the ANOVA is based on the consideration that it is an effective way to determine whether the means of the two samples can be attributed to the differences of instructional methods. Furthermore, the analysis accurately assesses the within group variance (error) so that effects of

instruction methods can be better ascertained.

4.2 Pre-test

As a pre-test, the Canadian Test of Basic Skills, was administered to the Grades 7 & 9 students of both the experimental and control groups in May of 1994. The tests were machine scored by the publisher and returned. The administration of the pre-test served a couple of needs; it served its primary function of providing a diagnostic measure of student academic ability, and it was used to establish a whether there was a comparable base of writing achievement between the two groups prior to the commencement of the computer-assisted writing instruction.

4.2.1 Pre-test Analysis

Tables 10 and 11 provide the pre-test results as determined by the application of a one-way analysis of variance, by grade.

4.2.2 Grade 7 Pretest Analysis of Variance

Table 10

Summary of Analysis of Variance for Grade 7 Pretest

Source of Variance	SS	df	MS	*F*
Between-groups	1.3	1	1.3	0.12
Within-groups	28.9	33	11.3	

Table 10 shows that the pretest indicates that the Between-groups variance of 1.3 is small relative to the Within-groups or error variance of 11.3 obtaining a statistically non-significant *F* ratio of 0.12 indicating there is no significant difference in the writing skills of the grade 7 subjects prior to beginning the treatment.

4.2.3 Grade 9 Pretest Analysis of Variance

Table 11

Summary of Analysis of Variance for Grade 9 Pretest

Source of Variance	SS	df	MS	*F*
Between-groups	2.6	1	2.6	0.45
Within-groups	15.6	13	1.05	

Table 11 also shows that the pretest indicates that the Between-

group variance of 2.6 is small relative to the Within-groups or error variance of 1.05 obtaining a statistically non-significant *F* ratio of 0.45 indicating there is no significant difference in the writing skills of the grade 9 subjects prior to beginning the treatment.

4.2.4 Summary of the Pre-test Analysis of Variance

These results indicate that at the time of the pre-test there was very little difference in the writing skills of the students in grades 7 and 9.

These results established a reliable and reasonable grounds for the study to proceed to another stage, as it is clear that whatever differences that might be detected in the post-test cannot be attributed to initial differential between the two groups.

4.3 Post-test Results

As with the pre-test, the post-test was administered to the subjects of both groups in May of 1995. The tests were electronically scored by the publisher. Along with providing a diagnostic measure of student learning the post-test was used to determine whether the treatment had an effect on the students' writing skills. As mentioned earlier only the grade 7 and 9 subjects will be considered for the study's post-test because the pre-test indicated there was a significant

difference in the writing skills of the grade 8 subjects prior to beginning the treatment.

4.4 Testing of Hypothesis One

Tables 12 and 13 reflect the findings of the Grade 7 and 9 ANOVA's. The hypotheses advanced in Chapter 3 were restated for analysis.

4.4.1 Conceptual Hypothesis 1

Computer-assisted writing instruction is a superior method of teaching writing skills to aboriginal students at the grade 7 level.

4.4.2 Operational Hypothesis 1

Computer-assisted writing instruction is more effective than the traditional approach of the teaching of writing skills to aboriginal students at the grade 7 level.

4.4.3 Mathematical Hypothesis 1

No significant difference is to be found between the computer-assisted writing instruction method and the traditional method of writing instruction on the writing skills of aboriginal students at the grade 7 level.

4.4.4 Grade 7 Post-test Analysis of Variance

Table 12

Summary of Analysis of Variance for Grade 7 Post-test

Source of Variance	SS	df	MS	F
Between-Groups	1.3	1	1.3	0.76
Within-groups	28.9	33	1.7	

Table 12 shows us that the findings of this ANOVA indicate the Between-group variance of 1.3 is small relative to the Within-group or error variance of 1.7 obtaining a statistically non-significant *F* ratio of 0.76. Therefore, no significant difference exists in the writing skills after the treatment. As such, the Null hypothesis that stated no significant difference is to be found between the computer-assisted writing instruction method and the traditional method of writing instruction on the writing skills of aboriginal students at the grade 7 level was accepted and its Operational and Conceptual hypotheses must be rejected.

4.4.5 Explanations

Student migrancy could have a possible effect on the outcome of this study. Families move to and from the reserve at all times of the school

year. Housing, sponsorship for post secondary or vocational education, and changes in the provincial social programs are factor that can cause changes in the samples. Because of the small sample numbers, one or two students not receiving full benefit of the treatment or encountering problems adjusting to the new learning environment may adversely affect the means for that group.

4.5 Testing of Hypothesis Two

4.5.1 Conceptual Hypothesis 2

Computer-assisted writing instruction is a superior method of teaching writing skills to aboriginal students at the grade 9 level.

4.5.2 Operational Hypothesis 2

Computer-assisted writing instruction is more effective than the traditional approach of the teaching of writing skills to aboriginal students at the grade 9 level.

4.5.3 Mathematical Hypothesis 2

No significant difference is to be found between the computer-assisted writing instruction method and the traditional method of writing instruction on the writing skills of aboriginal students at the grade 9 level.

4.5.4 Grade 9 Post-test Analysis of Variance

Table 13

Summary of Analysis of Variance for Grade 9 Post-test

Source of Variance	SS	df	MS	F
Between-Groups	2.6	1	2.6	3.08
Within-groups	20.4	15	0.85	

Table 13 shows that the findings of this ANOVA indicate the Between-group variance of 2.6 is small relative to the Within-group or error variance of 0.85 obtaining a statistically non-significant *F* ratio of 3.08. While the differences increased substantially when compared with the results of Grade 7 post-tests it still failed to attain significant difference at .05 level of confidence. Therefore, the Null or Mathematical Hypothesis staing that no significant difference is to be found between the computer-assisted writing instruction method and the traditional method of writing instruction on the writing skills of aboriginal students at the grade 9 level is accepted and the Conceptual and Operational Hypotheses are rejected.

4.4.5 Explanation

Two students included in the experimental group assessment joined

the program in progress. Both students came from broken homes and experienced difficulty in being accepted by their peers in both, community and school settings. The control group lost one student over the course of the year. This student may have been low achiever and removing him from the program may have raised the mean scores of the control group.

4.6 Summary

This chapter reported the analytical methods- One-way ANOVA to test the two hypotheses postulating the relative advantages of using computer-assisted instruction over the traditional approach of teaching writing skills to two groups of aboriginal students

In both cases, the ANOVA showed there was no statistically significant difference found in the writing skills of the two groups at the end of the program irrespective of the methods of instruction used.

Plausible explanations to such outcomes were advanced.

Chapter 5

Conclusions and Recommendations

5.0 Introduction

This chapter is divided into three sections. The first section is a brief summary of the purpose, design, and methodology of the project. The second section will state the findings and the third section will conclude the findings and make recommendations for further research.

5.1 Summary of the Study

The purpose of the study was to investigate whether students receiving computer-assisted writing instruction would outperform students receiving traditional writing instruction using pencil and paper on the language arts component of a standardized diagnostic test.

Following the quasi-experimental research design, this study compared the computer-assisted writing instruction method with the traditional writing instruction using pencil and paper of the Grades 7 & 9 students of two aboriginal schools in southern Manitoba. The Grade 8 students did not participate in the study because a significant difference in the writing skills existed prior to beginning the project and any improvement or change would be difficult to attribute to the treatment. The Canadian Test of Basic Skills served as the pre- and post-tests. An

ANOVA was performed on the mean scores of the language arts component to determine whether there was a significant difference in the writing skills following the treatment.

To enhance the validity of the study, the students and staff of the control group were not informed, nor were the students of the experimental group, that they were participating in a research project.

An Operational Hypothesis, a Conceptual Hypothesis, and a Mathematical or Null Hypothesis was stated for each grade. The one-way analysis of variance (ANOVA) was applied to the mean scores of the subjects' CTBS results after the two groups had been exposed to different instructional strategies.

5.2 Findings

The ANOVA found there was no statistical significance in the writing skills for both Grade 7 and 9 subjects between experimental and control groups. Therefore, the Mathematical or Null Hypothesis that stated no significant difference is to be found between the computer-assisted writing instruction method and the traditional method of writing instruction on the writing skills of aboriginal students was accepted and the Operational and Conceptual hypotheses were automatically rejected.

5.3 Recommendations

Based on the results of this study, and considering the limitations of this study, the following recommendations can be made for future research:

a. Increase the sample size for each group. With small sample sizes, as was the case in this project, any individual with unexpected performance will unduly effect the results. As well, a provision for identifying subjects in the experimental group that enter the program later on in the school year should be taken into consideration. A remedial program to familiarize the student with the concepts of the computer and computer-assisted instruction should be in place for these students. Lacking a remedial or upgrading course, these students should be excluded from the study as they would tend to adversely effect the outcome. In so doing, however, the sample size will again be affected.

b. Establish a mechanism for the ongoing monitoring of the project. The provision for a schedule of meetings should be included in the logistics segment of the implementation plan for the sharing of information and providing an ongoing evaluation of the project. If problems are encountered with any aspect of the program delivery, adjustments could be suggested and agreed upon at these meetings. If the

problems encountered by subjects are seemingly unsurmontable, reference to external consultants should be used to avoid unwanted attrition of the size of the experimental group. School psychologists, resource teachers, and curriculum specialists are key personnel that could be called upon to provide the necessary assistance to deal with student experiencing problems that are unrelated to the effectiveness of instructional strategies.

c. The insignificant effects of computer-assisted instruction, as reported in this study, could be attributed to the culturally insensitive standardized test. It is therefore recommended that educators should explore other means of assessing the subjects. Freeze (1990, p.12), for instance, used a combination of the Test of Written Language (TOWL-2), a curriculum-based pre-test, an ecological mid-assessment in the form of an interview, and a curriculum-based post-test. Through these battery of assessment tools, the performance outcomes of aboriginal students could be more accurately ascertained than simply dependent upon one single outcome measurement.

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